ASSESSMENT OF HORSEBACK SURVEYS OF KANGAROOS. *Memoirs of the Queensland Musem 42(2): 504. 1998*:- Ground surveys of kangaroos form the basis of many studies on kangaroo habitat use, population dynamics and social organisation. They provide estimates of population composition and size, and the latter can be used to calibrate aerial counts. Walked line transects have been shown by Southwell (1994) to return accurate estimates of population size. Less time-consuming surveys using vehicles along tracks are frequently biased and not always possible, but may, nevertheless, provide useful indices of kangaroo numbers. An alternative is to conduct surveys on horseback.

Line transect methodology involves determining the distances to objects from the transect line. The decay in sightability away from the line is then modelled, allowing an estimate of density to be calculated. In order of importance, the technique carries four assumptions (Buckland et al., 1993):

1, Animals on the transect line are always seen

2, Animals do not move before being counted, and none are counted twice

3, Distances and angles are measured without error

4, Sightings are independent events.

Compared with foot surveys, horseback surveys may be more likely to meet these assumptions because kangaroos may flush later and not as far, and the observer can concentrate more on sighting animals than on negotiating the transect.

During Sept. 1993, foot and horseback surveys were compared along identical transects at two sites in central-western Queensland: Idalia NP (24°53'S, 144°46'E) and Terrick Terrick, a neighbouring sheep grazing property. At both sites, vegetation ranges from grassland to acacia woodland, with some areas of dense regrowth and fallen timber. On each site, four transects, each 5km long, were walked by a single observer navigating using a sighting compass. Transects on Idalia were walked twice to boost sample size. For each transect, the two survey methods (horseback and foot) were separated by 24h, the order varying. Distances to kangaroos were determined with a rangefinder and angles from the transect line to each animal determined using a sighting compass, allowing perpendicular distances to be calculated. For each kangaroo species, data were pooled across each site for analysis and were analysed using the computer program DISTANCE (Buckland et al., 1993) as described by Clancy et al. (1997).

The two survey methods returned similar estimates of density for the three common species counted (Red Kangaroos, *Macropus rufus*, Common Wallaroos, *M. robustus*, and Eastern Grey Kangaroos, *M. giganteus*) (Table 1). The disparity for wallaroos on Terrick Terrick may be the result of heaping at zero distance during the horseback surveys, resulting in an overly steep sightability curve and inflated density estimate. At such high densities, observer saturation and reactive movement can also lead to inaccurate estimates (Southwell, 1994). Though not quantified, kangaroos appeared to flush later and not as far when confronted by an observer on horseback compared with one on foot. Horseback surveys generally yielded larger sample sizes (Table 1), which usually leads to improved modelling of sightability (Buckland et al., 1993). This larger sample size is reflected in much flatter sightability curves for horseback surveys compared with foot surveys (Fig. 1), presumably resulting from the higher vantage point. Surveying on horseback was approximately twice as fast as walking on foot and observers were less fatigued. Such advantages of horseback surveys must be contrasted with the additional costs of transporting and maintaining horses, and having observers competent with horses. Some habitats will be unsuitable for horseback surveys, such as steep terrain and thick vegetation, and fences create barriers, requiring access to gates.

TABLE 1. Density estimates (D) and associated sample sizes (n) for horseback and foot surveys at the two sites.

Site	Kangaroo species	Horseback		Foot	
		D	n	D	n
Idalia	Red	13.89	(143)	15.67	(104)
Idalia	Wallaroo	21.08	(116)	22.75	(111)
Terrick Terrick	Red	18.44	(84)	16.53	(68)
Terrick Terrick	Wallaroo	85.16	(371)	59.97	(202)
Terrick Terrick	Eastern Grey	7.81	(25)	8.59	(55)

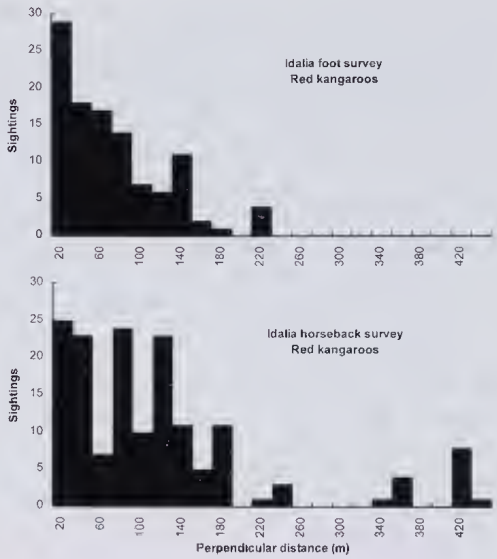

FIG. 1. Histograms of perpendicular distances of sightings of red kangaroos along transect lines conducted on foot and on horseback at Idalia NP.

Acknowledgements

We thank Glen Edwards and John Michelle for acting as observers on foot and horseback surveys, respectively. Comments from Stuart Cairns improved an earlier draft. This work was funded by Queensland Department of Environment.

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